REMARKS

This amendment is in response to the Office Action mailed October 20, 2004. In the Office Action, the Examiner:

- objected to the Specification because of two informalities;
- objected to claims 2, 4, 26, and 27;
- rejected claims 1, 6, 16, 23-25 under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement;
- rejected claims 5-10, 12, 14-18, 28/15, 30-32, and 33/12/11/2 under 35 U.S.C. 112, second paragraph, as being indefinite;
- rejected claim 1 under 35 U.S.C. 102(e) as being anticipated by Jones et al.;
- rejected claims 19, 20, and 22 under 35 U.S.C. 103(a) as being unpatentable over Alamounti et al. (US6,185,258) in view of Benning et al. (US6,594,226);
- rejected claim 21 under 35 U.S.C. 103(a) as being unpatentable over Alamounti et al., Benning et al., and Golemon et al. (U.S. Provisional Application 60/157,290);
- rejected claims 28/19 and 29/28/19 under 35 U.S.C. 103(a) as being unpatentable over Almounti et al., Benning et al. as applied to claim 19, and further in view of Monsen (US4,733,402); and
- allowed claims 2, 3, 4, 11, 13, 33/11/2, 34/2. amd 34/3 if rewritten or amended to overcome the objection set forth in the Office Action.

In this amendment, the specification has been amended to conform with the Examiner's requirement and to correct a literal error. Claims 1-16, 18-19, 22-23, 25, 28, and 30-34 are amended. Claims 21 and 26 are cancelled, and new claims 35-43 are presented. Consideration of the newly presented claims and reconsideration of the rejected claims are respectfully requested.

Claim 1 as amended recites:

A method of transmitting a signal having a sequence of symbols through at least one channel with intersymbol interference, comprising the steps of:

dividing the sequence of symbols to form a plurality of symbol streams; and

processing the plurality of symbol streams before transmitting each symbol stream through a channel, wherein processing the plurality of symbol streams comprises time-reversing at least one of the symbol streams.

As recited above, the method in claim 1 as amended comprises time-reversing at least one symbol sequence before transmitting it through a channel. Because the symbol sequence itself is time-reversed, a receiver with a time reversal function is required in order to detect the original symbol sequence, as described on page 14 of the specification.

In contrast, Jones does not disclose processing a plurality of symbol streams by time-reversing at least one of the symbol streams. In Jones, the data stream 63 is converted into parallel data words 75 (Col. 4, lines 8-11). The data words 75 are sent to a modulator 66, which generates output signatures 72 using an inverse Fast Fourier Transform function. The output signatures are not sequences of data but are envelope shapes generated by the modulator 66 in response to receiving the data words 75 (Col. 4, lines 11-13 and lines 41-47). It is these envelope shapes, not the data streams themselves, that are time-reversed and complex conjugated in Jones (Col. 4, lines 13-14, lines 39-54, lines 59-65, and FIG. 5). Since the data streams in Jones are not time-reversed before transmission, the transmitted data stream can be received by a conventional multicarrier receiver 88, which does not include a time-reversal function (Col. 5, lines 60-63 and FIG. 6). Therefore, claim 1 as amended is patentable over Jones.

Claim 2 as originally submitted was objected to because "the transmission frame" in line 5 should be changed to "a transmission frame", but the claim was otherwise allowed. Claim 2 has been amended to overcome this objection and to more clearly state the invention as claimed. Claim 2 as amended is believed to be patentable.

Claim 3 has been amended for clarity and should still be allowable.

Claim 4 as originally submitted was objected to because "the transmission frame" in line 5 should be changed to "a transmission frame", but the claim was otherwise allowed. Claim 4 has been amended to overcome this objection and to more clearly state the invention as claimed. Claim 4 as amended is believed to be patentable.

Claim 5 has been amended to depend from claim 3. The amendment should overcome the rejection based on U.S.C. 112, second paragraph.

Claim 6 has been amended to depend from claim 3 and to delete the recitation of "random fashion", which was the cause for the rejection based on U.S.C. 112, first paragraph. Support for the amendment can be found on page 15 lines 7-10 of the specification. Claim 6 as amended is believed to be patentable.

Claims 7-8 have been amended to correct literal errors. Claims 7-8 as amended depend ultimately from amended claim 2 and include further limitations in addition to the limitations in claim 2 as amended. Claims 7-8 are therefore patentable at least because claim 2 as amended is patentable.

Claim 9 has been amended to overcome the rejections based on U.S.C. 112, second paragraph, and is believed to be patentable.

Claim 10 as amended depends from claim 9 as amended and includes further limitations in addition to the limitations in claim 9 as amended. Therefore, the rejection concerning claim 10 should also be withdrawn.

Claim 11 has been amended to be in independent form and to more clearly define the invention as claimed. Claim 11 is believed to be patentable.

Claims 12-14 as amended depend from claim 11 as amended and include further limitations in addition to the limitations in claim 11 as amended. Claim 12 and 14 are also amended to overcome the rejections based on 35 U.S.C. 112, second paragraph. Therefore, claims 12-14 should also be patentable.

Claim 15 has been amended to overcome the rejection based on 35 U.S.C. 112, second paragraph, and is believed to be patentable.

Claim 16 has been amended to delete the recitation of "random fashion". Support for the amendment can be found on page 15 lines 7-10 of the specification. Claim 16 as amended is believed to be patentable.

Claim 17 and claim 18 as amended depend from claim 15 as amended and include further limitations in addition to the limitations in claim 15 as amended. Claim 17 and claim 18 as amended are therefore patentable for at least the same reasons claim 15 as amended is patentable.

Claim 19 as amended recites:

> A system for transmitting data while reducing the effects of fading and handling intersymbol interference effectively comprising:
> a first antenna group and a second antenna group, each group comprising a plurality of antennas; and
> an encoder coupled to the first and second antenna groups and adapted to divide a signal into a first and a second symbol streams, each symbol stream having a plurality of symbols, the encoder adapted to transmit the first symbol stream through the first antenna group using a delay diversity technique during a first block of a frame, to transmit the second symbol stream through the second antenna group using a delay diversity technique during the first block of the frame, to transmit through the second antenna group a time reversed and complex conjugate form of the first symbol stream during a second block of the frame, and to transmit through the first antenna group a time reversed, complex conjugate and negated form of the second symbol stream during the second block of the frame.

Alamounti does not disclose an encoder adapted to transmit through the second antenna group a time reversed and complex conjugate form of the first symbol stream during a second block of the frame, and transmit through the first antenna group a time reversed, complex conjugate and negated form of the second symbol stream during the second block of the frame. Alamounti merely suggestes a base station for transmitting "a sequence of symbols through one antenna, and the same sequence of symbols—but delayed—through another antenna." (Col. 2, lines 6-8) Delaying a sequence of symbols is very different from time-reversing a sequence of symbols. In a delayed sequence of symbols, the sequence of symbols are still in the same order with respect to each other, while a time-reversed sequence of symbols are in a different, time-reversed order as compared to the sequence of symbols before time-reversal. (See page 14 of the specication.)

Furthermore, the teachings in Alamounti about dividing a signal into a first and a second symbol streams (Col. 3 line 60 to Col. 4 line 22, and Col. 8 claim 5) cannot be combined with the deley diversity scheme discussed in the background in Alamounti (Col. 1 line 63 to Col. 2 line 8), because the former assumes channels without delays and have no use of a delay diversity scheme which introduces delays in an effective channel. Therefore, claim 19 as amended is patentable over Alamounti in view of Benning.

Claim 20, claim 22 as amended , claim 23 as amended, claim 24, claim 25 as amended, and claim 27 depend from claim 19 as amended and include further limitations in addition to the limitations in claim 19 as amended. Therefore, claim 20, claim 22 as amended , claim 23 as amended, claim 24, claim 25 as amended, and claim 27 are patentable for at least the same reason claim 19 is patentable.

Furthermore, claim 22 has been amended to delete the recitation of "random fashion". Support for the amendment can be found on page 15 lines 7-10 of the specification.

Claim 28 has been amended to be in independent form. Claim 28 as amended recites:

> A system for receiving and processing data comprising:
> at least one antenna adapted to receive a first symbol stream in a first block of a frame and a second symbol stream in a second block of the frame, each symbol stream comprising a plurality of symbols;
> a combining filter coupled to the antenna and adapted to form a third symbol stream that is a time reversed and complex conjugate form of the second symbol stream received in the second block; and
> a matched filter coupled to the combining filter and adapted to form decoupled first and second outputs from the first and third symbol streams.

Claim 28 as amended is believed to be patentable at least because none of the cited references discloses a combining filter adapted to form a symbol stream that is a time reversed and complex conjugate form of a received symbol stream and a matched filter adapted to form decoupled first and second outputs from another received symbol stream and the time-reversed and complex conjugated symbol stream.

Claim 29 and claims 30-33 as amended depend from claim 28 as amended and

include further limitations in addition to the limitations in claim 28 as amended. Therefore, claim 29 and claims 30-33 as amended are patentable for at least the same reasons claim 28 as amended is patentable.

Claim 34 has been rewritten in independent form to overcome the objection in the Office Action. Claim 34 has been further amended for clarity and to more clearly distinguish the claim over the cited references. Claim 34 as amended recites:

> A method for receiving and processing signals transmitted from a transmitter comprising receiving a plurality of symbol sequences each comprising symbols from a plurality of pre-transmission symbol streams, and processing the received symbol sequences to generate decoupled outputs each for separately detecting a different one of the pre-transmission symbol streams, wherein processing the received symbol sequences comprises time reversing at least one of the symbol sequences.

Claim 34 as amended is believed to be patentable because none of the cited references teaches or suggests processing a received symbol sequence by time reversing the symbol sequence in order to generate decoupled outputs each for separately detecting a different one of a plurality of pre-transmission symbol streams.

New claims 35-36 depend form claim 34 as amended and include further limitations in addition to the limitations in amended claim 34. Therefore, new claims 35-36 are patentable for at least the same reasons claim 34 as amended is patentable.

New claims 37-38 depend from claim 1 as amended and include further limitations in addition to the limitations in amended claim 1. Therefore, new claims 37-38 are patentable for at least the same reasons claim 1 as amended is patentable.

New claim 39 depends ultimately from claim 11 as amended and includes further limitations in addition to the limitations in amended claim 11. Therefore, new claim 39 is patentable for at least the same reasons claim 11 as amended is patentable.

New claim 40 depends ultimately from claim 28 as amended and includes further limitations in addition to the limitations in amended claim 28. Therefore, new claim 40 is patentable for at least the same reasons claim 28 as amended is patentable.

The argument regarding claim 34 as amended applies to new claim 41.

Therefore, new claim 41 should also be patentable.

New claims 42-43 depend from new claim 41 and include further limitations in addition to the limitations in new claim 41. Therefore, new claims 42-43 are patentable for at least the same reasons new claim 41 is patentable.

The Examiner is invited to call the undersigned at the number listed below if any matter can be solved by telephone.

Respectfully submitted,

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